B. Decreased Idle Time and Constant Bandwidth Data-On-Demand Broadcast Delivery Matrices

The following is a step-by-step description of the exemplary process illustrated in Figure 4 for generating a scheduling matrix for a data file having six data blocks:

START

(Step 402) Receive a number of data blocks for a data file (x); assume the number of data blocks is equal to 6 (x = 6).

(Step 404) Set j = 0

(Step 406) Clear a Reference Array (RA)

(Step 408) Compare j to x.

(Step 412) j is less than x (0<6), let i = 0

(Step 414) Compare i to x.

(Step 418) i is less than x (0<6). Read matrix positions of column [0] in the SM and write to RA; initially, the SM is empty so nothing is written into RA.

(Step 420) Does RA contain data block i or blk0?

(Step 422) RA does not contain anything because it is empty. Write blk0 into position [0, 0] in SM and the RA.

(Step 424) Add 1 to i (i=1) to derive value for position [1, 0]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (1<6). Read matrix positions of column [1] in the SM and write to RA; initially, the SM is empty so nothing is written into RA.

(Step 420) Does RA contain data block i or blk1?

(Step 422) RA does not contain blk1. Write blk1 into position [1, 0] in SM and the RA.

(Step 424) Add 1 to i (i=2) to derive value for position [2, 0]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (2<6). Read matrix positions of column [2] in the SM and write to RA; initially, the SM is empty so nothing is written into RA.

(Step 420) Does RA contain data block i or blk2?

(Step 422) RA does not contain blk2. Write blk2 into position [2, 0] in SM and the RA.

(Step 424) Add 1 to i (i=3) to derive value for position [3, 0]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (3<6). Read matrix positions of column [3] in the SM and write to RA; initially, the SM is empty so nothing is written into RA.

(Step 420) Does RA contain data block i or blk3?

(Step 422) RA does not contain blk3. Write blk3 into position [3, 0] in SM and the RA.

(Step 424) Add 1 to i (i=4) to derive value for position [4, 0]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (4<6). Read matrix positions of column [4] in the SM and write to RA; initially, the SM is empty so nothing is written into RA.

(Step 420) Does RA contain data block i or blk4?

(Step 422) RA does not contain blk4. Write blk4 into position [4, 0] in SM and the RA.

(Step 424) Add 1 to i (i=5) to derive value for position [5, 0]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (5<6). Read matrix positions of column [5] in the SM and write to RA; initially, the SM is empty so nothing is written into RA.

(Step 420) Does RA contain data block i or blk5?

(Step 422) RA does not contain blk5. Write blk5 into position [5, 0] in SM and the RA.

(Step 424) Add 1 to i (i=6). Go back to Step 414.

(Step 414) Compare i to x.

(Step 416) i is equal to x (6=6). Increment j by 1 (j=1). Go to Step 406.

(Step 406) Clear a Reference Array (RA)

(Step 408) Compare j to x.

(Step 412) j is less than x (1<6), let i = 0.

(Step 414) Compare i to x.

(Step 418) i is less than x (0<6). Read matrix positions of column [1] in the SM and write to RA. Position [1, 0] contains blk1; thus, blk1 is written into RA. All other positions are empty.

(Step 420) Does RA contain data block i or blk0?

(Step 422) RA does not contain blk0. Write blk0 into position [1, 1] in the SM and the RA. RA now has blk1 and blk0.

(Step 424) Add 1 to i (i=1) to derive value for position (2, 1]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (1<6). Read matrix positions of column [2] in the SM and write to RA. Position [2, 0] contains blk2. All other positions are empty. RA now has blk1, blk0, and blk2.

(Step 420) Does RA contain data block i or blk1?

(Step 424) RA contains blk1. Thus, nothing is written into position [2, 1]. Add 1 to i (i=2) to derive value for position [3, 1]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (2<6). Read matrix positions of column [3] in the SM and write to RA. Position [3, 0] contains blk3. All other positions are empty. RA now has blk1, blk0, blk2, and blk3.

(Step 420) Does RA contain data block i or blk2?

(Step 424) RA does contain blk2. Thus, nothing is written into position [3, 1]. Add 1 to i (i=3) to derive value for position [4, 1]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (3<6). Read matrix positions of column [4] in the SM and write to RA. Position [4, 0] contains blk4. All other positions are empty. RA now has blk1, blk0, blk2, blk3, and blk4.

(Step 420) Does RA contain data block i or blk3?

(Step 424) RA does contain blk3. Thus, nothing is written into position [4, 1]. Add 1 to i (i=4) to derive value for position [5, 1]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (4<6). Read matrix positions of column [5] in the SM and write to RA. Position [5, 0] contains blk5. All other positions are empty. RA now has blk1, blk0, blk2, blk3, blk4, and blk5.

(Step 420) Does RA contain data block i or blk4?

(Step 424) RA does contain blk4. Thus, nothing is written into position [5, 1]. Add 1 to i (i=5) to derive value for position [0, 1]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (5<6). Read matrix positions of column [0] in the SM and write to RA. Position [0, 0] contains blk0. All other positions are empty. RA already contains blk0; thus, blk0 is discarded.

(Step 420) Does RA contain data block i or blk5?

(Step 424) RA does contain blk5. Thus, nothing is written into position [0, 1]. Add 1 to i (i=6). Go back to Step 414.

(Step 414) Compare i to x.

(Step 416) i is equal to x (6=6). Increment j by 1 (j=2). Go to Step 406.

(Step 406) Clear a Reference Array (RA)

(Step 408) Compare j to x.

(Step 412) j is less than x (2<6), let i = 0.

(Step 414) Compare i to x.

(Step 418) i is less than x (0<6). Read matrix positions of column [2] in the SM and write to RA. Position [2, 0] contains blk2. All other positions are empty. RA now has blk2.

(Step 420) Does RA contain data block i or blk0?

(Step 422) RA does not contain blk0. Write blk0 into position [2, 2] in the SM and the RA. RA now has blk2 and blk0.

(Step 424) Add 1 to i (i=1) to derive value for position (3, 2]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (1<6). Read matrix positions of column [3] in the SM and write to RA. Position [3, 0] contains blk3. All other positions are empty. RA now has blk2, blk0, and blk3.

(Step 420) Does RA contain data block i or blk1?

(Step 422) RA does not contain blk1. Write blk1 into position [3, 2] in the SM and the RA. RA now has blk2, blk0, blk3, and blk1.

(Step 424) Add 1 to i (i=2) to derive value for position (4, 2]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (2<6). Read matrix positions of column [4] in the SM and write to RA. Position [4, 0] contains blk4. All other positions are empty. RA now has blk2, blk0, blk3, blk1, and blk4.

(Step 420) Does RA contain data block i or blk2?

(Step 424) RA does contain blk2. Thus, nothing is written into position [4, 2]. Add 1 to i (i=3) to derive value for position (5, 2]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (3<6). Read matrix positions of column [5] in the SM and write to RA. Position [5, 0] contains blk5. All other positions are empty. RA now has blk2, blk0, blk3, blk1, blk4, and blk5.

(Step 420) Does RA contain data block i or blk3?

(Step 424) RA does contain blk3. Thus, nothing is written into position [5, 2]. Add 1 to i (i=4) to derive value for position (0, 2]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (4<6). Read matrix positions of column [0] in the SM and write to RA. Position [0, 0] contains blk0. All other positions are empty. RA already contain blk0; thus blk0 is discarded.

(Step 420) Does RA contain data block i or blk4?

(Step 424) RA does contain blk4. Thus, nothing is written into position [0, 2]. Add 1 to i (i=5) to derive value for position (1, 2]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (5<6). Read matrix positions of column [1] in the SM and write to RA. Position [1, 0] contains blk1 and position [1, 1] contains blk0. RA already contains blk1 and blk0; thus blk1 and blk0 are discarded. All other positions are empty.

(Step 420) Does RA contain data block i or blk5?

(Step 424) RA does contain blk5. Thus, nothing is written into position [1, 2]. Add 1 to i (i=6). Go back to Step 414.

(Step 414) Compare i to x.

(Step 416) i is equal to x (6=6). Increment j by 1 (j=3). Go to Step 406.

(Step 406) Clear a Reference Array (RA)

(Step 408) Compare j to x.

(Step 412) j is less than x (3<6), let i = 0.

(Step 414) Compare i to x.

(Step 418) i is less than x (0<6). Read matrix positions of column [3] in the SM and write to RA. Position [3, 0] contains blk3 and position [3, 2] contains blk1. Blk3 and blk1 are written into RA. All other positions are empty.

(Step 420) Does RA contain data block i or blk0?

(Step 422) RA does not contain blk0. Write blk0 into position [3, 3] in the SM and the RA. RA now has blk3, blk1 and blk0.

(Step 424) Add 1 to i (i=1) to derive value for position (4, 3]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (1<6). Read matrix positions of column [4] in the SM and write to RA. Position [4, 0] contains blk4. All other positions are empty. RA now has blk3, blk1, blk0 and blk4.

(Step 420) Does RA contain data block i or blk1?

(Step 424) RA does contain blk1. Thus, nothing is written into position [4, 3]. Add 1 to i (i=2) to derive value for position (5, 3]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (2<6). Read matrix positions of column [5] in the SM and write to RA. Position [5, 0] contains blk5. All other positions are empty. RA now has blk3, blk1, blk0, blk4, and blk5.

(Step 420) Does RA contain data block i or blk2?

(Step 422) RA does not contain blk2. Write blk2 into position [5, 3] in the SM and the RA . RA now has blk3, blk1, blk0, blk4, blk5, and blk2.

(Step 424) Add 1 to i (i=3) to derive value for position (0, 3]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (3<6). Read matrix positions of column [0] in the SM and write to RA. Position [0, 0] contains blk0. All other positions are empty. RA already contains blk0; thus, discard blk0.

(Step 420) Does RA contain data block i or blk3?

(Step 424) RA does contain blk3. Thus, nothing is written into position [0, 3]. Add 1 to i (i=4) to derive value for position (1, 3]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (4<6). Read matrix positions of column [1] in the SM and write to RA. Position [1, 0] contains blk1 and position [1, 1] contains blk0. All other positions are empty. RA already contains blk1 and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk4?

(Step 424) RA does contain blk4. Thus, nothing is written into position [1, 3]. Add 1 to i (i=5) to derive value for position [2, 3]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (5<6). Read matrix positions of column [2] in the SM and write to RA. Position [2, 0] contains blk2 and position [2, 2] contains blk0. All other positions are empty. RA already contains blk2 and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk5?

(Step 424) RA does contain blk5. Thus, nothing is written into position [2, 3]. Add 1 to i (i=6). Go back to Step 414.

(Step 414) Compare i to x.

(Step 416) i is equal to x (6=6). Increment j by 1 (j=4). Go to Step 406.

(Step 406) Clear a Reference Array (RA)

(Step 408) Compare j to x.

(Step 412) j is less than x (4<6), let i = 0.

(Step 414) Compare i to x.

(Step 418) i is less than x (0<6). Read matrix positions of column [4] in the SM and write to RA. Position [4, 0] contains blk4. Blk4 is written into RA. All other positions are empty.

(Step 420) Does RA contain data block i or blk0?

(Step 422) RA does not contain blk0. Write blk0 into position [4, 4] in the SM and the RA. RA now has blk4 and blk0.

(Step 424) Add 1 to i (i=1) to derive value for position (5, 4]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (1<6). Read matrix positions of column [5] in the SM and write to RA. Position [5, 0] contains blk5 and position [5, 3] contains blk2. All other positions are empty. RA now has blk4, blk0, blk5, and blk2.

(Step 420) Does RA contain data block i or blk1?

(Step 422) RA does not contain blk1. Write blk1 into position [5, 4] of the SM and the RA. RA now has blk4, blk0, blk5, blk2, and blk1.

(Step 424) Add 1 to i (i=2) to derive value for position (0, 4]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (2<6). Read matrix positions of column [0] in the SM and write to RA. Position [0, 0] contains blk0. All other positions are empty. RA already contains blk0; thus, do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk2?

(Step 424) RA does contain blk2. Add 1 to i (i=3) to derive value for position (1,4]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (3<6). Read matrix positions of column [1] in the SM and write to RA. Position [1, 0] contains blk1 and position [1, 1]. All other positions are empty. RA already contains blk1 and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk3?

(Step 422) RA does not contain blk3. Write blk3 into position [1, 4] of the SM and the RA. RA now has blk4, blk0, blk5, blk2, blk1, and blk3.

(Step 424) Add 1 to i (i=4) to derive value for position (2, 4]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (4<6). Read matrix positions of column [2] in the SM and write to RA. Position [2, 0] contains blk2 and position [2, 2] contains blk0. All other positions are empty. RA already contains blk2 and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk4?

(Step 424) RA does contain blk4. Thus, nothing is written into position [2, 4]. Add 1 to i (i=5) to derive value for position [3, 4]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (5<6). Read matrix positions of column [3] in the SM and write to RA. Position [3, 0] contains blk3, position [3, 2] contains blk1, and position [3, 3] contains blk0. All other positions are empty. RA already contains blk3, blk1, and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk5?

(Step 424) RA does contain blk5. Thus, nothing is written into position [3, 4]. Add 1 to i (i=6). Go back to Step 414.

(Step 414) Compare i to x.

(Step 416) i is equal to x (6=6). Increment j by 1 (j=5). Go to Step 406.

(Step 406) Clear a Reference Array (RA)

(Step 408) Compare j to x.

(Step 412) j is less than x (5<6), let i = 0.

(Step 414) Compare i to x.

(Step 418) i is less than x (0<6). Read matrix positions of column [5] in the SM and write to RA. Position [5, 0] contains blk5, position [5, 3] contains blk2, and position [5, 4] contains blk1. Blk5, blk2, and blk1 are written into RA. All other positions are empty.

(Step 420) Does RA contain data block i or blk0?

(Step 422) RA does not contain blk0. Write blk0 into position [5, 5] in the SM and the RA. RA now has blk5, blk2, blk1, and blk0.

(Step 424) Add 1 to i (i=1) to derive value for position (0, 5]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (1<6). Read matrix positions of column [0] in the SM and write to RA. Position [0, 0] contains blk0 and all other positions are empty. RA now has blk5, blk2, blk1, and blk0.

(Step 420) Does RA contain data block i or blk1?

(Step 424) RA does contain blk1. Add 1 to i (i=2) to derive value for position (1, 5]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (2<6). Read matrix positions of column [1] in the SM and write to RA. Position [1, 0] contains blk1, position [1, 1] contains blk0, and position [1, 4] contains blk3. All other positions are empty. RA already contains blk0 and blk1; thus, do not write a duplicate copy. Write blk3 into RA. RA now has blk5, blk2, blk1, blk0, and blk3.

(Step 420) Does RA contain data block i or blk2?

(Step 424) RA does contain blk2. Add 1 to i (i=3) to derive value for position (2, 5]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (3<6). Read matrix positions of column [2] in the SM and write to RA. Position [2, 0] contains blk2 and position [2, 2] contains blk0. All other positions are empty. RA already contains blk2 and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk3?

(Step 424) RA does contain blk3. Add 1 to i (i=4) to derive value for position (3, 5]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (4<6). Read matrix positions of column [3] in the SM and write to RA. Position [3, 0] contains blk3, position [3, 2] contains blk1, position [3, 3] contains blk0. All other positions are empty. RA already contains blk3, blk1, and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk4?

(Step 422) RA does not contain blk4. Write blk4 into position [3, 5] of the SM and the RA. The RA now has blk5, blk2, blk1, blk0, blk3, and blk4.

(Step 424) Add 1 to i (i=5) to derive value for position [4, 5]. Go back to Step 414.

(Step 414) Compare i to x.

(Step 418) i is less than x (5<6). Read matrix positions of column [4] in the SM and write to RA. Position [4, 0] contains blk4 and position [4, 4] contains blk0. All other positions are empty. RA already contains blk4 and blk0; do not write a duplicate copy.

(Step 420) Does RA contain data block i or blk5?

(Step 424) RA does contain blk5. Thus, nothing is written into position [3, 4].

(Step 424) Add 1 to i (i=6). Go back to Step 414.

(Step 414) Compare i to x.

(Step 416) i is equal to x (6=6). Increment j by 1 (j=5). Go to Step 406.

(Step 406) Clear a Reference Array (RA)

(Step 408) Compare j to x.

(Step 410) j is equal to x (6<6); END.

C.

United States Patent & Trademark Office

Office of Initial Patent Examination -- Scanning Division

Application deficiencies found during scanning:

☐ Page(s)___________ of ________________________________ were not present for scanning.
(Document title)

☐ Page(s)___________ of ________________________________ were not present for scanning.
(Document title)

☐ ***Scanned copy is best available.***

Pages 38 to 48 numbered as Specification are in Appendix A